

REMARKS

Summary of the Office Action

Claims 1 – 5, 9, 12 – 14, 16, 17, and 19 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Korean Pre Grant Publication KR20020046534 (“*Chun*”) in view of U.S. Patent No. 4,031,770 (“*Ishikawa*”).

Claims 6 – 8 and 18 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Chun* and *Ishikawa* further in view of U.S. Patent No. 2,760,381 (“*Pickles*”).

Claims 10, 11, and 15 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Chun* and *Ishikawa* further in view of U.S. Pre-Grant Publication No. 2002/0051860 (“*Hiroi*”).

Interview Summary

Applicants thank the Examiner and the Supervisor for the courtesies extended to Applicants’ representative during the in-person interview held on October 24, 2011. During the interview, Applicants’ representative provided reasoning as to why *Ishikawa* fails to disclose **planiform** contact regions as recited in the presently claimed subject matter. Applicants feel that the interview furthered prosecution, as hopefully the Examiners now more clearly understand the claimed subject matter and Applicants’ position. Other details of the interview will be discussed below with respect to specific rejections.

The Rejections under 35 U.S.C. § 103

Claims 1 – 5, 9, 12 – 14, 16, 17, and 19 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Chun* in view of *Ishikawa*. Applicants respectfully submit that the combined references do not disclose or suggest all of the claimed features, nor would a person of ordinary skill in the relevant field have been prompted to combine the cited prior art in the manner claimed. To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and

contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should “identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *in re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In view of the above, Applicants respectfully submit that the claimed combination fails to teach all of the claimed features of independent claims 1 and 16, and also therefore, of those claims depending therefrom. In contrast to claims 1 and 16, and as admitted by the Examiner, *Chun* does not expressly disclose:

the tooth flanks of said toothed gear wheels comprising an involute-free mesh profile in the force transmission area, and transition from a concave area directly to a convex area, effective profiles of said tooth flanks matching in a manner that the meshing of the tooth flanks occurs at planiform contact regions, linearly viewed in cross section, along their complete height, and the effective profiles of the tooth flanks coordinated with each other over their entire height, thereby establishing said planiform contact regions, linearly viewed in cross section, along their complete height.

The Examiner turns to *Ishikawa* to allegedly teach these features of the independent claims. Applicants respectfully disagree.

As was discussed during the interview, claims 1 and 16 recite that the meshing of the tooth flanks occurs in *planiform* contact regions, *linearly viewed in cross section*. This means that the contact regions between the claimed tooth flanks have multiple dimensions when viewed from a perspective view, and are seen as a line when viewed in *cross section*. Thus, the contact region between the respective tooth flanks occurs at multiple points in a planar area, and not just

single points or lines, which do not have area. In other words, the planiform contact regions can be defined as a geometric *area* that allow contact between the respective tooth flanks.

Applicants respectfully submit that *Ishikawa* fails to teach the planiform contact regions. To the contrary, *Ishikawa* discusses only *point or line* contacts between the respective tooth flanks. For example, at column 2, line 65 to column 3, line 2, *Ishikawa* indicates that “it is to be noted that such basic rack formation gives a dual tooth contact type W-N gear which makes point contact on two neighboring teeth simultaneously *at respective points A₁ and A₂* when point C₁ coincides with the pitch point in the same reference plane.” (Emphasis added.)

Likewise, at column 3, lines 16-22, *Ishikawa* makes it clear that “in this manner, such basic tooth profile forms a dual tooth contact type W-N gear of which two neighboring teeth make *line contact* with the mating gear simultaneously along the convex and concave circular arcs 3 and 4 respectively, including points A₃ and A₄, when the point C₃ coincides with the pitch points in the same reference plane.” (Emphasis added).

The above citations are among other citations within *Ishikawa* that discuss the *point and line* contacts between the tooth flanks of the respective gears. Nowhere does *Ishikawa* (or *Chun*, for that matter) discuss planiform contact regions between the respective tooth flanks. During the interview (and in the Interview Summary), the Examiner took the position that even a point has infinitesimal area. However, Applicants find this argument difficult to accept.

It is well known in geometry that a point is a zero-dimensional concept. By this, it is meant that a point has no volume, area, length or dimensional concept. In addition, while a line may have a length, it also does not have volume, area or other dimensional concepts other than possible length. As such, it is difficult to understand how point or line contacts between gear teeth as disclosed in *Ishikawa* could be read to include the planiform contacts as recited in the present claims.

Thus, alone or combined with *Chun*, *Ishikawa* fails to teach or suggest each and every feature of independent claims 1 and 16. Accordingly, Applicants respectfully submit that the Examiner has failed to make a *prima facie* case of obviousness with respect to claims 1 and 16,

and those claims that depend respectively therefrom. As such, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1 – 5, 9, 12 – 14, 16, 17, and 19 as obvious over *Chun* and *Ishikawa*.

Claims 6 – 8 and 18 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Chun* and *Ishikawa* further in view of *Pickles*; and claims 10, 11, and 15 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Chun* and *Ishikawa* further in view of *Hiroi*.

Applicants respectfully traverse these rejections on the legal basis set forth above. In particular, Applicants respectfully submit that the remaining references fail to make up for the deficiencies of *Chun* and *Berlinger*. Specifically, the other references are cited as allegedly teaching additional features of the dependent claims, but not for teaching or suggesting the features discussed above, namely the planiform contact regions. Thus, even if one of ordinary skill in the art were to combine *Chun* and *Ishikawa* with one or more of the remaining references, the combined references still fail to teach or suggest each and every feature of amended claims 1 and 16.

For at least these reasons, Applicants respectfully submit that claims 2 – 15 and 17 – 19 are also allowable, at least because they depend from allowable claims 1 and 16 respectively. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features of the claimed subject matter, Applicants respectfully submit that claims 1 – 19 are allowable. Applicants respectfully request that the rejections of claims 1 – 19 under 35 U.S.C. §103(a) be withdrawn.

Claims 1-19 are patentable over the Lunin article

Submitted herewith is an IDS citing an article written by Stepan Lunin (“the *Lunin* article”). Applicants respectfully submit that the present claims are patentable over the *Lunin* article, whether alone or in combination with any of the other art currently on the record.

The *Lunin* article discloses computer modeling of contact points on a wide variety of gear surfaces. However, Applicants respectfully submit that the *Lunin* article fails to disclose “effective profiles of said tooth flanks matching in a manner that the meshing of the tooth flanks occurs at planiform contact regions, linearly viewed in cross section, *along their complete height (h₄,h₅)*” as recited in independent claims 1 and 16. (Emphasis added). As discussed above, none of the current references on record disclose, teach or suggest this claim feature. Since the *Lunin* article also fails to disclose this feature, any combination of the *Lunin* article with the other references also fails to teach this claimed feature.

Accordingly, claims 1 and 16 (and the dependent claims therefrom) are patentable over the *Lunin* article, whether alone or in combination with any of the references currently on the record.

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CONCLUSION

Applicants believe that a full and complete response has been made to the pending Office Action and respectfully submit that all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to call Applicants' undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,
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